Pertussis Clinician Fact Sheet

Agent: *Bordetella pertussis*, a fastidious Gram-negative bacterium.

Symptoms:

- Initial presentation as a mild upper respiratory tract infection
- Progresses to cough, which may develop to paroxysms of cough (in children with characteristic inspiratory whoop), and commonly followed by vomiting
- Minimal or absent fever
- Symptoms wane gradually over weeks to months (duration typically 6-10 weeks)

In children under 6 months: atypical presentation including apnea; whoop often absent. In older children and adults: atypical presentation generally prolonged cough; whoop is absent.

Severity:

Disease is most severe in unimmunized or under-immunized children under the age of 12 months. Watch for seizures, pneumonia, encephalopathy, or death.

Differential Diagnosis:

In adults, the clinical presentation is similar to viral respiratory infections, which are generally far more common. Other possibilities include *Bordetella parapertussis*, *Mycoplasma pneumoniae*, *Chlamydia trachomatis*, *Chlamydia pneumoniae*, and *Bordetella bronchiseptica*. Pertussis should be considered in differential diagnosis of chronic cough, especially when pertussis is known to be circulating in the community.

Clinical Case Definition:

A cough illness lasting around 2 weeks with one of the following: paroxysms of coughing, inspiratory "whoop," or post-tussive vomiting, without other apparent cause.

Laboratory Criteria:

- Isolation of Bordetella pertussis from clinical specimen or
- Positive polymerase chain reaction for B. pertussis

Case Classification:

Probable: meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to a laboratory-confirmed case

Confirmed: a case that is culture positive and in which an acute cough illness of any duration is present; or a case that meets the clinical case definition and is confirmed by positive PCR; or a case that meets the clinical case definition and is epidemiologically linked directly to a case confirmed by either culture or PCR.

Epidemiology:

- Humans are the only host.
- Transmission is by close contact via aerosol droplets. Pertussis occurs endemically in 3-5 year cycles.
- Incubation period ranges from 6-21 days, average of 7-10 days.
- Immunity wanes approximately 5-12 years following vaccination OR natural infection, therefore older children and adults form the susceptible reservoir.
- Pertussis is highly contagious and as many as 80% of non-immune household contacts will acquire the disease.
- Patients are most infectious during the initial presentation and during the first two weeks of the coughing.

Diagnostic Testing:

In children, the inspiratory "whoop" of pertussis is characteristic of this disease. Children with the classical presentation of paroxysmal cough, inspiratory "whoop" and subsequent vomiting can be considered to have pertussis and treated. However, adults and children with atypical presentations should have the diagnosis of pertussis verified through laboratory testing in order to reduce the amount of antibiotics incorrectly prescribed for viral conditions.

Serology:

Serologic diagnosis requires paired acute and convalescent sera and therefore it is not recommended for diagnosis due to the wait for convalescent sera. The use of a single serum specimen for diagnostic purposes is not well standardized outside of a research setting. Serology is best used to evaluate a person's immune response to vaccination. Serological tests should **never** be used as the sole laboratory method of pertussis diagnosis.

DFA:

While the speed of this test is appealing to determine antibiotic therapy, the sensitivity and specificity of this test are unacceptable. The majority of adults with pertussis will have negative DFA results.

PCR:

Currently, this test is the best option in most clinical circumstances. This test provides acceptable sensitivity in children and adults, has a relatively short turnaround time, and is available at most commercial reference laboratories. Nasopharyngeal swabs and aspirates are the preferred method for specimen collection. PCR results may not be reliable after 5 days of appropriate antibiotic treatment. Currently, no data are available as to how long patients with pertussis remain PCR positive. **NOTE:** NP swabs have thin wire shafts and are flexible. You cannot collect an NP specimen with a throat swab. Throat swabs and cough plates are not acceptable specimens.

Culture:

Culture is the gold standard for pertussis diagnosis. However, it is highly specific only in the initial stages of disease, and the sensitivity varies widely. Additionally, the length of time to obtain results makes it unacceptable for determining patient therapy. Nasopharyngeal swabs and aspirates are the preferred method for specimen collection. Pertussis DFA or PCR testing is always recommended in addition to culture. **NOTE:** NP swabs have thin wire shafts and are flexible. You cannot collect an NP specimen with a throat swab. Throat swabs and cough plates are not acceptable specimens. Generally this test may be used when:

- Testing children (sensitivity in adult patients is unacceptable)
- Using an on-site laboratory (transport decreases yield)
- Patients have not started taking antibiotics
- Patients are within two weeks of symptom onset
- Determining possible antibiotic resistance.

Treatment:

While antibiotics will eradicate the carriage of *Bordetella pertussis,* thereby decreasing communicablility, the extent to which antibiotics reduce the duration and severity of illness is unknown. It is widely believed that antibiotics started early in the course of illness are more likely to reduce the illness duration and severity than antibiotics started late in the course of illness. Public health recommends limiting antibiotic treatment to those who are within three weeks of the onset of their illness unless they are:

- Infants under the age of 1
- Pregnant women
- Patients with ongoing, close contact with infants under the age of 1 or pregnant women (e.g., parents and caregivers of infants, daycare workers, pediatricians)

Therapy recommended by the CDC in the 2005 revision of Guidelines for Control of Pertussis Outbreaks:

Drug	Infants <1 month	Children 1-5 months	Children ≥ 6 months	Adults
Azithromycin	10 mg/kg per day in a single daily dose for 5 days **Recommended treatment**	10 mg/kg per day in a single daily dose for 5 days	10 mg/kg in a single dose on day 1; then 5 mg/kg per day in a single dose on days 2-5 (maximum 500 mg/day)	500 mg in a single dose on day one; then 250 mg per day in a single dose on days 2-5
Erythromycin	40-50 mg/kg per day in 4 divided doses for 14 days	40-50 mg/kg per day in 4 divided doses for 14 days	40-50 mg/kg per day in 4 divided doses for 14 days (maximum 2 g/day)	2 g per day in 4 divided doses for 14 days
Clarithromycin	Not recommended	15 mg/kg per day in 2 divided doses for 7 days	15 mg/kg per day in 2 divided doses for 7 days (maximum 1 g per day)	1 g per day in 2 divided doses for 7 days
TMP/SMZ	Contraindicated for infants < 2 months	Contraindicated for infants < 2 months; for infants aged ≥ 2 months, 8 mg/kg per day (TMP), 40 mg/kg per day (SMZ) in 2 divided doses for 14 days	8 mg/kg per day (TMP), 40 mg/kg per day (SMZ) in 2 divided doses for 14 days	320 mg per day (TMP), 1,600 mg per day (SMZ) in 2 divided doses for 14 days

Resistance to macrolides is rare. Penicillin-class drugs and first/second generation cephalosporins are not effective. Susceptibility testing is generally not done.

Management of People Exposed to Pertussis:

Vaccination:

For close contacts **<7 years of age** of pertussis cases:

- Assess immunization status;
- Recommend a fourth dose be given to all children who have received their third dose of DTaP 6 months or more before the exposure;
- Recommend a booster be given to all children who have received four doses of DTaP, unless the fourth dose was given in the past 3 years.
- *Note: asymptomatic contacts under the age of seven that have not received at least three doses of DTaP before the exposure shall be excluded from school/child care unless they elect to receive chemoprophylaxis.*

For close contacts **7-10 years of age** of pertussis cases:

- Currently, there is no vaccine licensed for use in children ages 7-10.

For close contacts (10-18 years of age) of pertussis cases:

- Recommend vaccination with Tdap
- A 5-year interval between TD and Tdap is safe, but may cause a higher risk of local or systemic reactions; Tdap may be given after a shorter interval when the risk of transmission outweighs the risk of a reaction
- Adolescents with history of pertussis should still receive the vaccine
- *Note: There is only one vaccine approved for 10 year olds.*

For close contacts **>18 years of age** of pertussis cases:

- Advise people of the availability of a licensed vaccine for adults
- ACIP recommends adults receive a single dose of Tdap to replace a single dose of Td for booster immunization
- Tdap may be given at an interval shorter than 10 years since receipt of last tetanus-toxoid containing vaccine to protect against pertussis (interval as short as approximately 2 years)
- Adults who have or will have close contact with an infant <12 months of age should receive a single dose of Tdap
- Women who received the last tetanus-toxoid containing vaccine ≥10 years earlier should receive Td during pregnancy in preference to Tdap
- Women who received the last tetanus-toxoid containing vaccine <10 years earlier should receive Tdap in the post-partum period, according to the routine recommendations for vaccinating adult contacts of infants <12 months of age
- Pregnant women who have not received the primary 3-dose series for tetanus should begin the series during pregnancy

Prophylactic Antibiotics:

Prophylactic antibiotics may reduce secondary transmission in household and other settings. However, due to the lack of evidence supporting this conclusion, high number of pertussis cases occurring despite widespread antibiotic chemoprophylaxis, and the risk of antibiotic resistance developing due to overuse of antibiotics, UDOH recommends focusing efforts to provide chemoprophylaxis on high-risk contacts.

High-risk contacts include:

- Infants under the age of 1;
- Pregnant women;
- Contacts who work with high-risk individuals (e.g., daycare workers, healthcare workers with direct patient contact, etc.);
- Inadequately immunized schoolchildren under the age of 7; and
- Individuals, including parents and siblings, living in the same household with other high-risk contacts.

Exclusion from School or Daycare:

Symptomatic persons with pertussis should be excluded from school or childcare settings until they have received five days of appropriate antibiotic therapy, or if not treated until 21 days after onset of symptoms.

It is recommended that adults with pertussis refrain from public activities and the workplace for the first 5 days of a full course of antimicrobial treatment. Persons with pertussis who do not take antimicrobial treatment should refrain from public activities and the workplace for 21 days from onset of cough.

Outbreaks:
Additional measures to limit transmission may be appropriate in outbreak settings. Please consult with your local health department or the Office of Epidemiology, Utah Department of health, if you suspect an outbreak.

Vaccine/Immunization:

For up to date information on pertussis vaccines, including possible adverse events and reporting, please consult www.immunize-utah.org or www.cdc.gov/nip.

References:

1. Red Book: 2003 Report of the Committee on Infectious Diseases, Elk Grove Village, IL, American Academy of Pediatrics; 2003, pages 472-486. This book contains detailed recommendations for treatment, vaccination, and prophylaxis of children.
2. Control of Communicable Diseases Manual (18th Edition), David Heymann, Ed., 2004.
3. Manual of Clinical Microbiology (8th Edition), Murray et.al., Eds., 2003
4. Principles and Practice of Infectious Diseases, Mandell et.al., Eds., 2000.
5. Loeffelholz et.al., Jour.Clin.Microbiol. 37 (9), 2872-2876, 1999.
6. Centers for Disease Control and Prevention. Guidelines for the Control of Pertussis Outbreaks. Centers for Disease Control and Prevention: Atlanta, GA, 2000. http://www.cdc.gov/nip/publications/pertussis/guide.htm

Utah Department of Health
Office of Epidemiology

February 18, 2009